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# Primer on Forestry Investment

By DRS. THOMAS J. STRAKA, STEVEN H. BULLARD and WILLIAM F. WATSON

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Most forest farmers know that growing timber is a good investment. Some forest farmers, however, and many new timberland investors may not fully understand the basic ingredients that make up a forestry investment. Like other ventures, forest farming involves costs and revenues, and rates of return can be calculated. These rates can be compared with interest rates for other investments, but forest farming is not exactly like your other investments. It has special qualities.

To start with, you cannot invest in timber without investing in land. So when you consider a timberland investment, you are considering a timber and a land investment. Both values increase with inflation. Southern pine sawtimber prices, for example, have generally increased about 2.5 percent above the annual inflation rate. The early 1980s did not maintain the trend, but from 1971 to 1979 values for southern land and timber increased 6 to 7 percent above inflation each year. Long-run southern pine timber prices should continue to outpace other price increases, so land and timber will continue to be an excellent way to protect your money from inflation.

Another characteristic of timberland investments is the long time period often involved. A full growing cycle for southern pine is 25 to 35 years. You may be able to buy an established forest, say 20 years old, and quickly earn harvest revenue. A large timberland purchase may include timber of many ages, allowing periodic or annual harvest revenues. Small forests, however, may only provide occasional income, through thinnings and major harvests every few decades.

When buying timberland, carefully consider the age structure of the forest because it will dictate the cash flow from your investment. Small timberland investments are likely to produce infrequent income and, especially when the forest is young, timberland can be a moderately illiquid investment. Since the timing of timber revenue is very predictable, however, careful planning can minimize cash flow problems.

When acquired, bare land often requires a large initial expense for forest establishment. Annual management costs and property taxes, however, are likely to require only small cash payments. Again, these cash flows are very predictable and easy to include in an investment analysis (See article on page 26 by Dr. Clifford

Hickman). Current tax laws enhance forestry investments and help reduce the impact of early expenses. Forest regeneration expenses, for example, can qualify for an investment tax credit and deductions over seven tax years.

Another unique quality of timberland is that it can be an enjoyable investment, providing hunting and other outdoor recreation for you and your family. Although such benefits are not easily included in investment appraisals, they can be a very important part of timberland investment decisions.

## Forest Yield

*Yield* is just that, what the forest yields in timber products. Pulpwood is usually expressed in cords (a 4 x 4 x 8 foot rick of wood) and sawtimber in board feet (a 1 inch x 1 foot x 1 foot board contains 1 board foot). Since it is the amount of timber you expect from a forest, yield (and stumpage price) also reflects the revenue you expect to receive from timber. Two key elements affect the timber yield you can expect from your forest: site index and stocking.

*Site index* describes the quality of forest land for growing trees (soil productivity). Site is always in reference to a particular tree species; for example, loblolly pine sites or white oak sites. Few species grow equally well on the same site. Specifically, site index is the average total height of the dominant trees in a forest stand at an index age.

In the South, for instance, an index age of 50 years is commonly used for natural pine stands and 25 years for pine plantations. If forest land has the capacity to grow dominant loblolly pines to an average total height of 90 feet in 50 years, it is classified as "site index 90 land for loblolly pines, base age 50." Site index is important because of its dramatic impact on timber yield at harvest. On Virginia's coastal plain, loblolly pine yields by site index for a 20-year-old stand with 700 trees per acre are

Site Index (base age 25)	Yield (cords per acre)
50	22.6
60	34.5
70	52.9
80	80.9

Because site quality has such a major effect on timber yield, it should be a key element in pricing any forest tract. Higher site index land is worth more than lower site index land for timber production. If your forest management capital is limited, the highest site index areas of your forest should receive investment priority since they provide maximum timber production.

*Stocking* is a measure of how many trees are in a forest stand relative to how many are needed to attain your objectives. There are two common measures of stocking: trees-per-acre and basal area. *Basal area* is the cross-sectional area of trees at breast height (4½ feet above the ground) per acre, measured in square feet. Or, in plain English, basal area is the square foot area of the top of all the tree stumps on an acre of land if all the trees were to be cut 4½ feet above the ground.

To meet your objectives, your forest stand should be fully stocked, not understocked or overstocked. In the South, as a rule of thumb, the basal area of the forest stand should approximate the 50-year site index of the land. Using this rule, site index 90 land should have a stocking of about 90 square feet of basal area per acre.

Trees-per-acre is a vague measure of stocking, unless you have an idea of tree size and how the trees are spaced in the stand. But it has the great advantage of being easily understood.

Stocking has little effect on total yield of your forest stand if you are only interested in cubic feet of wood produced. Stocking has a great impact, however, on the timber products available at harvest. You need a properly stocked stand to grow sawtimber. For example, for a 30-year-old loblolly pine stand, stocking differences can account for over 5,000 additional board feet:

Trees Per Acre	All Trees	Multiple Products	
	as Pulpwood (Cords)	Sawtimber (Board Feet)	Pulpwood (Cords)
500	52.6	7,523	32.5
600	52.7	5,551	37.2
700	52.6	4,090	40.6
800	52.2	3,011	43.0
900	51.7	2,214	44.6
1,000	51.7	1,628	45.6

Most forest farmers will need a forester to appraise stocking levels. Timberland investors would be wise to consider existing stocking levels when purchasing tracts of timber.

### Glossary of Investment Terms

Several terms are common in investment analyses. To help prepare you for the other financial articles in this issue of *Forest Farmer*, we will define some of the terms used to describe forestry investments.

*Cash flow* is the cash generated for each year of the investment (cash receipts minus cash payments). If payments are more than receipts for any year, a "negative cash flow" results. The basic information needed to evaluate an investment is how much cash is generated or paid out and when does each cash receipt or payment occur. Once the timing of cash flow is known, the investment's rate of return can be determined.

*Rate of return* (also called *internal rate of return* or *return on investment*) is the interest rate earned by the invested money. It is equivalent to the interest rate paid on a savings account or the yield of a bond. Usually a forester will calculate the rate of return using a computer or a financial calculator. The calculation involves finding the interest rate earned by the investment's cash flow. All you need to remember about an investment's rate of return is that it is an interest rate, just like any other interest rate, and that it can be directly compared with the interest rates of other investments.

Rates of return may or may not include inflation. In an investment analysis, the term *real* indicates that inflation has been removed. The rate of return earned by an investment may be stated in real terms or in *market* (or *nominal*) terms. That is, the rate of return will include inflation (*market interest rate*) or will be net of inflation (*real interest rate*). If the interest rate for an investment is not specified as real or inflated, the stated rate of return usually includes inflation. If the analysis includes an allowance for inflation, the term *real rate of return* is almost always used.

Be wary of the stated rate of return on a timberland investment if the interest rate earned can't be distinguished as real or market. If inflation is 5 percent annually and one investment has a market rate of return of 7 percent and a second investment has a real rate of return of 3 percent, you might be tempted to take the higher return. But the first investment only returns about 2 percent in real terms. The second investment has the higher *real* return.

Inflation usually has large impact on stumpage values. Southern pine sawtimber prices have generally increased at 2 to 3 percent above the inflation rate during recent years. This is why timberland is considered good protection against inflation. If southern pine stumpage (standing timber) prices increase at 2 percent above the inflation rate, this is called a *real price increase*. A second method of evaluating a timberland investment produces a *net present value* (or a *present net worth*). A net present value is stated in dollars. It is the value today of an investment at a specified interest rate. If an investment has a net present value of \$600 per acre at an 8 percent interest rate, this means the investment will produce an 8 percent rate of return plus value of \$600 at the beginning of the investment.

If the net present value is negative, you are not earning the specified interest rate. Net present values are very dependent on the interest rate used. The average investor needs to be aware of net present value, but probably has a better understanding of the straightforward rate of return method for evaluating investments.

A third method of evaluating timberland investments produces a *bare land value* or (or *land expectation value*). This is a special type of net present value. It is the net present value of bare timberland if used in permanent timber production. Since it is a type of net present value, it is very dependent on the interest rate used. It is the theoretical value of the *land* for timber growing, but subject to the assumptions used to obtain the net present value. Again, the average investor may want to use the rate of return to evaluate investments, unless net present value calculations are fully understood.

The *interest rate* (or *discount rate*) used in the investment analysis will affect the net present value and bare land value. The investor specifies the interest rate used in the analysis. It should be the rate of return he could obtain from his best alternative investment such as a certificate of deposit from a bank. This is why it is often called an *alternative rate of return*. An investor's alternative rate of return is not always easy to estimate. A main advantage of the rate of return approach is that an alternative investment rate does not have to be estimated.

In this primer we have identified some key questions you need to ask when considering a timberland investment: What's the site index of the land? What kinds of yields can I expect? What are stumpage prices expected to do? What levels of property tax and management expenses are expected? How will taxes affect my investment? What kind of *real* rate of return can I expect from this investment?

This is merely a primer on forestry investments. Don't be afraid to invest in the advice of a professional forester to answer these questions. The problems you may avoid by the simple investment in a forester are very likely to produce a reasonable "return." □